

# Bulletin #7

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## International Conference of Building Officials Publishes "Near-Source" Maps

The International Conference of Building Officials (ICBO) has published a book of maps to be used in determining engineering factors for new construction in California. This book, *Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada*, was prepared by the Department of Conservation's Division of Mines and Geology (DMG) in cooperation with the Structural Engineers Association of California's (SEAOC) Seismology Committee.

When SEAOC identified the need for the near-source maps, officials contacted DMG to find out what data existed. Fortunately, the information on which the maps are based was already available in a DMG database used to develop probabilistic seismic hazard maps for California.

These maps, produced in cooperation with the U.S. Geological Survey (USGS), have been available since March 1997 (see article in [Seismic Hazard Mapping Bulletin No. 2](#)).

The near-source maps, developed specifically for use with the 1997 *Uniform Building Code*™ (UBC), define the areas where an additional factor should be used to reduce risk to life and property in an earthquake. The 1997 UBC incorporated a new factor in engineering calculations to account for high ground motion near earthquake faults.

The new near-source maps are based on research following the Northridge and Kobe, Japan earthquakes showing that most buildings collapsing or having severe damage are located within five kilometers (three miles) of fault rupture. As a result of their observations, seismologists and engineers are recommending additional reinforcement of buildings located within a few kilometers of historical ground ruptures.

Determination of the near-source factor requires extensive geologic and seismologic information. First, a fault must be evaluated to determine whether it is active. Geologists generally consider a fault active if surface ground rupture has occurred during the last 11,000 years.

Second, the fault must be located on a three-dimensional grid. This information is available on the DMG *Fault Activity Map of California and Adjacent Areas*, which had been correlated with the more accurately mapped Alquist-Priolo fault maps during the statewide probabilistic seismic hazard study.

Third, a determination has to be made of the fault's slip rate. The slip rate database was also developed by

DMG and the USGS as part of the probabilistic seismic hazard study using widely recognized original research sources.

Finally, the magnitude of the largest earthquake expected to occur on the fault must be estimated. In this step, the fault is analyzed in "segments" that are thought to be capable of rupturing as independent earthquakes. The magnitude on a fault segment can be estimated based on the fault length or area of the fault plane.

In California, the known active surface faults are classified in the 1997 Uniform Building Code as A faults, B faults and C faults. An A fault is the most destructive and a C fault is the least destructive. Only the A and B faults are included in the probabilistic maps.

The slip rate and maximum magnitude of earthquakes associated with a fault are the basis for the categories. Category A faults exhibit magnitudes of 7.0 or greater and slip rates of at least 5 millimeters per year. Category B faults fall in the magnitude 6.5 to 7.0 range with slip rates varying depending on maximum magnitude.

The near-source factor is applied to structures within 15 kilometers (9.3 miles) of an A fault or within 10 kilometers (6.3 miles) of a B fault. Blind faults, those that do not rupture the ground surface, generally have not been evaluated.

The book of maps is available at an introductory price of \$39 from ICBO by phoning (800) 284-4406.

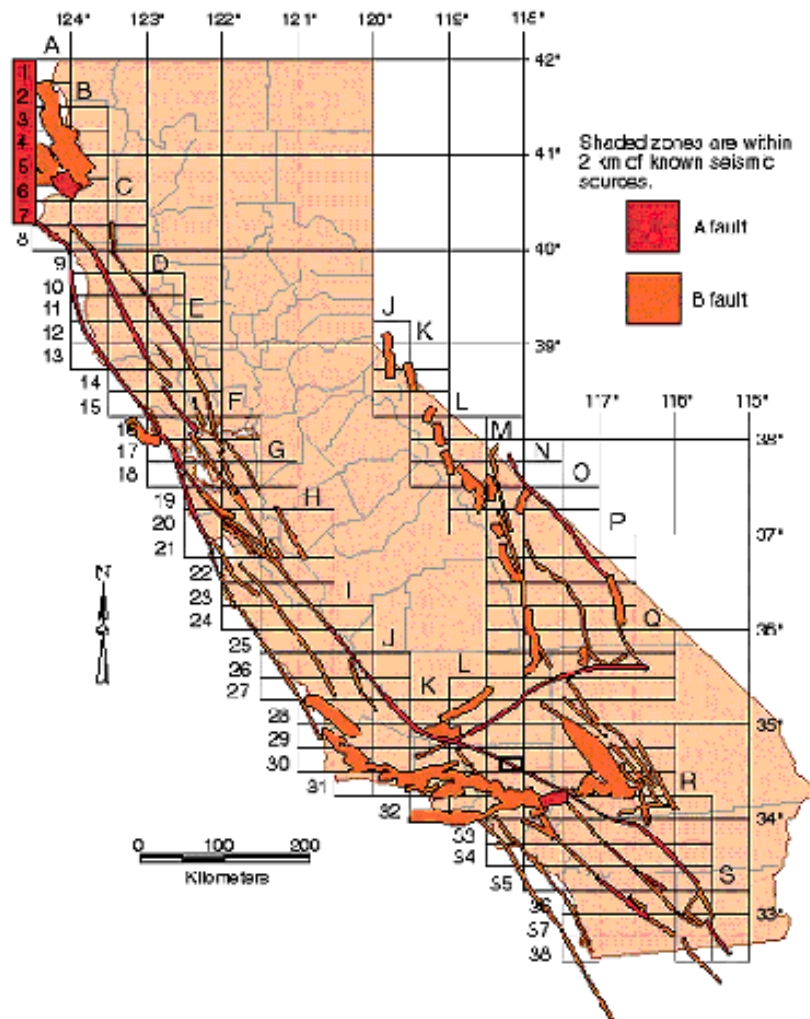


Figure Caption: Index map showing faults and locations of 1/4° latitude by 1/2° longitude grids for which active fault near-source maps are available. Shaded zones are within 2 km of known seismic sources.

## Seven More Preliminary Maps Become Official

Five new official seismic hazard zone maps and two revised maps covering parts of Los Angeles and Orange counties were released by the Department of Conservation on April 15, 1998. The new official maps cover the La Habra, Laguna Beach, Orange, Tustin, and Yorba Linda quadrangles.

The Anaheim and Newport Beach quadrangles, released as official maps in April 1997, have been revised. The Newport Beach map reflects new landslide information while on the Anaheim map liquefaction zones have been modified to accommodate new subsurface information.

Released as preliminary maps in October 1997, the maps were subjected to a six-month technical review and revision period. Twenty-one cities in Los Angeles and Orange counties are affected by the latest maps. The affected cities in Orange County include Anaheim, Brea, Buena Park, Costa Mesa, Fullerton, Irvine, Laguna Beach, Newport Beach, Orange, Placentia, Santa Ana, Tustin, and Yorba Linda. In Los Angeles County, the cities of Diamond Bar, Industry, La Habra, La Habra Heights, La Mirada, Los Angeles, Villa Park, and Whittier are affected.

The release follows the February 2, 1998 release of five official seismic hazard zone maps covering portions of Los Angeles and Ventura counties. Those maps are the Canoga Park, Calabasas, Newhall, Oat Mountain, and Van Nuys quadrangles.

The schedule for the release of the remaining 24 maps has been refined. Twelve will be released in late June 1998. The remainder will be released in September 1998. For the complete schedule, see the index map below.

## NEW DMG PUBLICATIONS

Three new free publications, Notes 33, 41, and 49, are available from the Division of Mines and Geology. The complete text of these notes, which is summarized below, is available at the DMG Web site:

<http://www.ca.gov/dmg/>

Printed copies are available from the DMG publications office:

801 K Street, 14<sup>th</sup> Floor  
Sacramento, CA 95814  
(916) 445-5716

### **Note 33**

#### ***Hazards from Mudslides, Debris Avalanches and Debris Flows in Hillside and Wildfire Areas***

Mudslides are common in the rainy season through-out California where slopes are steep. In arid southern California, frequent wildfires contribute to instability by removing vegetation that helps stabilize the soil.

Mudslides may take the form of fast-moving debris avalanches or slower-moving debris flows. Debris avalanches move at speeds exceeding 10 mph. Debris flows move more slowly.

Most fairly steep slopes have enough soil and loose rock for potential mudslides. To be safe, assume that all drainages in steep, hilly, or mountainous areas are capable of carrying debris flows, especially if relatively loose, sandy soils are present in the watershed.

Minimize the risk of mudslide damage by avoiding building sites at the bottoms and mouths of steep ravines and drainage courses. On steep slopes, the risk can be minimized by (1) reducing the height and slope of cuts and fills, (2) properly compacting fills and keying them into bedrock, and (3) properly controlling the flow of water.

### **Note 41**

#### ***General Guidelines for Reviewing Geologic Reports***

The geologic review is a critical part of the evaluation process of a proposed development. It is the responsibility of the reviewer to ensure each geologic investigation and the resulting report adequately address the geologic conditions at a given site.

In order to make appropriate evaluations of geologic reports, the reviewer should be an experienced geologist familiar with the investigative methods and techniques employed by the profession. In California, the reviewer must be licensed by the State Board of Registration for Geologists and Geophysicists in order to practice. Local agencies may have additional requirements.

The most critical item in a site investigation is the geologic report. In addition to the investigative data (See Note 49 below), the report should contain conclusions regarding the geologic hazards or problems found and recommendations to mitigate those geology-related problems that would have an impact on the proposed development.

**Note 49**                      *Evaluating the Hazard of Surface Fault Rupture*

The investigation of sites for the possible hazard of surface fault rupture is a difficult geologic task. Many active faults are complex, consisting of multiple breaks.

Most surface faulting is confined to a relatively narrow zone a few feet to a few yards wide, making building set-back the most appropriate mitigation method.

The evaluation of a given site with regard to the potential hazard of surface fault rupture is based extensively on the concepts of *recency* and *recurrence* of faulting along existing faults. Faults of known historic activity during the last 200 years, as a class, have a greater probability for future activity than faults classified as Holocene age (last 11,000 years), and a much greater probability of future activity than faults classified as Quaternary age (last 1.6 million years).

## **Do You Know...**

- a. What month is California Earthquake Preparedness month?
- b. Where is the most dangerous place to be in an earthquake?
- c. How much food and water should you have stored for each person in your family?
- d. Where you can get more information about preparing for an earthquake?

[\[Answers are below.\]](#)

## **Color Maps Available on DMG Web Site**

Each month the Division of Mines and Geology gets dozens of requests for color copies of the seismic hazard zone maps. Presently, only blue line versions of the printed maps are available through [BPS Reprographics in San Francisco](#) (see address below).

Meanwhile, [images of the color maps are available at the DMG's page of the Department of Conservation's Web site \(http://www.consrv.ca.gov/dmg/\)](http://www.consrv.ca.gov/dmg/). Division of Mines and Geology staff are testing production of copies of the color maps and we hope to have them available later this year.

## **Seismic Trivia [Answers to : "Do You Know..."]**

- a. April is California Earthquake Preparedness Month.
- b. The most dangerous place to be in an earthquake is near the exterior walls. Windows, facades, and architectural details are the first parts of the building to collapse.
- c. You should store enough food and water for each person in your family to last 72 hours, preferably a week.
- d. Contact the Southern California Earthquake Center at (213) 740-1560 for a publication on preparing for an earthquake, "Putting Down Roots in Earthquake Country."

# To Order Seismic Hazard Zone Maps

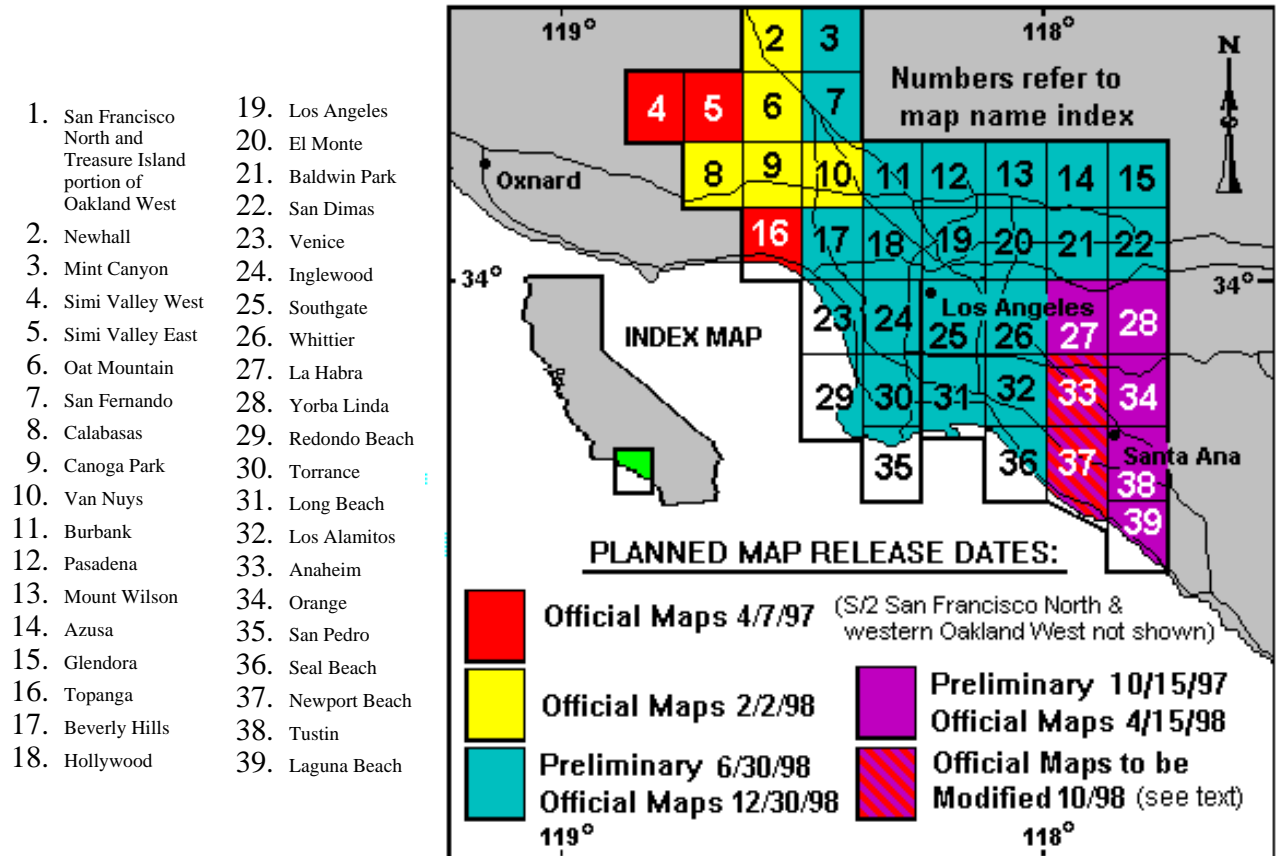
Seismic hazard zone maps for liquefaction and/or landslide potential are available from:

BPS Reprographic Services  
149 Second Street  
San Francisco, CA 94103  
(415) 512-6550

Contact BPS for price information.

**Note:** The image below is as it appeared in Bulletin #7.

[A more up-to-date schedule may be available.](#)



## For More Information...

The **Department of Conservation's Division of Mines and Geology** posts information pertaining to the Seismic Hazard Mapping Program at the Department of Conservation's Web site:

**<http://www.consrv.ca.gov/>**. For information about outreach services available to local governments, contact:

Candace Hil, Associate Planner  
Voice: (916) 324-1407  
Fax: (916) 445-3334  
E-mail: [chill@consrv.ca.gov](mailto:chill@consrv.ca.gov)

For assistance with guideline and/or map interpretation, questions or comments about the home page, or availability of data and data services, contact:

Jack McMillan, Outreach Coordinator  
Voice: (916) 323-8569

Fax: (916) 445-3334  
E-mail: [jmcmilla@consrv.ca.gov](mailto:jmcmilla@consrv.ca.gov)

For information about the **Fault Evaluation and Zoning Program**, contact:

**Bill Bryant, Senior Geologist**  
**Voice: (916) 323-9672**  
**Fax: (916) 445-3334**  
**E-mail: [bbryant@consrv.ca.gov](mailto:bbryant@consrv.ca.gov)**